WE referred in a previous number to ova having been artificially spawned from sea-trout, *S. trutta*, at the South Kensington Aquarium, which had been retained in captivity for three years, and had therefore not visited the sea. The ova have since become incubated, and the fry, which are hybrids, appear to be in a healthy state. The mortality amongst them is heavier than with those produced from ordinary fish, especially at the period when emerging from their shell. There is an abnormal number of monstrosities amongst them, which never live beyond a few days. The ova produced from fish in captivity occupy a longer time in hatching out than those spawned from wild fish. Owing to the severity of the weather this season, hatching operations have been greatly retarded, but the fry seem to be more vigorous and healthy in consequence.

TO show the value attached to the *S. fontinalis*, or brook-trout of America, when first introduced into this country some few years since, it may be mentioned that, according to the price-lists issued by pisciculturists at the time, 100*l.* per thousand was charged for them. The same amount was mentioned for whitefish, which, until last year, were not successfully acclimatised to our waters. The price charged at the present day for the same fish is about 2*l.* per thousand.

DR. J. P. LICHERDOPOL writes under date February 23 from Bucharest (Roumania) :—"Yesterday at 3.40 p.m. a slight shock of earthquake was noticed here, followed by two others strong enough to make objects hung on the walls move. Atmosphere calm, but covered with fog. No damage."

THE telephone system of Stockholm is developing rapidly: on January 15 it had 3164 subscribers, against 2335 in the beginning of 1885, and 865 in the previous year. Last year there were over 4½ million communications, of which 85,000 were by night. The subscription is about 7*l.* a year. Stockholm is connected by telephone with several neighbouring towns, the furthest being Trosa, 50 miles distant.

AT a recent meeting of the Paris Medico-Psychological Society, M. Rey (who was intrusted with documents, &c., left by Broca) gave the results of 347 observations by that eminent man on the weight of the three cerebral regions (*a*) the frontal lobes, (*b*) the occipital lobes, and (*c*) the parietal regions. In men the ratio of these parts to the brain is (*a*) 1 : 2·33, (*b*) 1 : 10·66, (*c*) 1 : 2·12. In females (*a*) 1 : 2·32, (*b*) 1 : 9·88, (*c*) 1 : 2·13. In men the left frontal lobe has more weight than the right; but the difference between the two diminishes with the weight of the whole organ. In the case of the occipital lobes and the temporal regions the right side preponderates over the left. In old men the loss of weight in the parieto-frontal regions is more sensible than that in the frontal and occipital lobes. It is still more pronounced in women; so that, while in adult age men have proportionally more in the frontal lobes, this proportion is reached by women in old age. In men the frontal lobes only attain their greatest weight at 35 years of age; but at 25 the parieto-temporal regions have their maximum weight. In women, with regard to the anterior lobes, there is little difference between 25 and 35 years of age.

MR. VAN VOORST has in the press and will very soon publish a new and enlarged edition of Prof. Mills' "Manualette" of the destructive distillation of petroleum, rosin oil, coal-tar, and kindred industries, with illustrations of shale retorts.

THE February number of *Petermann's Mittheilungen* contains a paper by Dr. Andries on the causes of the increasing number of accidents by lightning. As to the fact of the increase itself, he shows from statistics that this has, in the last fifty years, been three- to five-fold. In Bavaria the proportion is 1 to 5, and between 1854 and 1877 it has risen from 1 to 2·75 for all Germany. The question now is: Whence arises this striking increase? Various hypotheses have been advanced to account for it. Bezold refers it to varying maximum and minimum periods, the present being one of the former; Karsten attributes it to the decrease of forests, which made houses more and more the prominent points of a neighbourhood; others again allege the increase of lofty buildings, factories, and such like as the cause. Dr. Andries observes that although these may account for some of the increase, they cannot do so for all. Nor do they adequately explain the enormous and sudden increase in such a short period. He states the problem thus: "How can the electrical tension during thunderstorms be so increased that a greater number of bolts strike the earth than formerly? For it is not so much the increasing number of storms as their increased violence that causes the accidents by lightning." The main cause is said by him to be the enormous increase in the last half century in manufactories, locomotives, &c., filling the air with smoke, steam, and particles of dust of all kinds, the increase of population adding likewise to the impurity of the atmosphere. Having arrived at this point, viz. the enormous increase of foreign particles in the atmosphere, and their wide distribution by various currents of air, Dr. Andries describes at some length experiments made by himself and others on the subject, which showed that all the electrical phenomena of the air increased in intensity with the increase of dust in it, and to the same cause he attributes the increased appearances of the aurora borealis. Accidents by lightning in the southern half of the globe should, if this be correct, be much less frequent than in the other half; and this, he says, really appears to be the case. At any rate, he thinks, the southern lights are not visible nearly so frequently as those of the north.

THE additions to the Zoological Society's Gardens during the past week include eight Viscachas (*Lagostomus trichodactylus*) from Buenos Ayres, presented by Mr. E. Vere Dashwood; four American Hares (*Lepus americanus*) from North America, presented by Mr. F. J. Thompson; six Tuatera Lizards (*Sphenodon punctatus*) from New Zealand, presented by the Hon. Sir Julius Vogel, K.C.M.G.; a Macaque Monkey (*Macacus cynomolgus*) from India, fifteen Tuatera Lizards (*Sphenodon punctatus*) from New Zealand, deposited; two Yucatan Blue Jays (*Cyanocitta yucatanica*) from Yucatan, two Great Barbets (*Megalæma virens*) from the Himalayas, purchased; a Red Kangaroo (*Macropus rufus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

THE BINARY STAR γ CORONÆ AUSTRALIS.—Mr. J. E. Gore has recently computed elements of the orbit of this binary, fixing the periastron passage at 1886·53 and the period at 81·78 years. These elements differ widely from those deduced three or four years ago by Mr. Downing, who, by determining corrections to Prof. Schiaparelli's orbit, from a considerably larger number of observations than have been utilised by Mr. Gore, found the epoch of periastron passage to be 1883·203 with a period of 54·985 years. The position-angles computed from these two sets of elements now differ enormously, as is seen from the following tabular statement :—

Epoch		Angle		Distance	Computer
1886·0	...	51°·3	...	1″·28	Downing
1886·53	...	48°·5	...	1″·44	
1886·0	...	200°·7	...	1″·20	Gore
1886·53	...	196°·7	...	1″·13	

We venture to express the hope that those astronomers who can observe this object will not fail to do so in the present interesting stage of its physical history.

THE NEBULA ROUND MAIA.—Prof. E. C. Pickering states, in the *Astron. Nach.*, No. 2712, that the announcement of the discovery of the nebula near Maia by means of photography recalled to him the circumstance that certain peculiarities had been noticed in a photograph of the Pleiades taken at Harvard College Observatory on November 3, 1885. These were supposed at the time to be merely photographic defects, but it

now appears that one of the markings corresponds to the Maia nebula. The other irregularities seem to afford indications of the Merope nebula. There is also a faint narrow streak of light projecting from Electra on the following side.

PROF. LANGLEY ON THE EMISSION-SPECTRA OF BODIES AT LOW TEMPERATURES.—Prof. Langley having traced the solar spectrum in the infra-red so far as $\lambda = 0{\cdot}0027$mm., where it suddenly ceased, has since examined the emission-spectra of various terrestrial substances at temperatures from that of fusing platinum to that of melting ice, and more particularly of temperatures corresponding to the ordinary conditions of the soil. The result of his observations has been to show that the maximum of heat from cold and black bodies has in every case a wave-length greater than 0·0027mm.,—greater, that is to say, than that of the lowest solar heat which reaches us; and that further, that part of these spectra which has a greater wave-length than that of the point of maximum, represents a larger total amount of heat than the part with shorter wave-length. Prof. Langley believes that he has been able, by means of his bolometer, to trace out the emission-spectra of cold bodies so far as $\lambda = 0{\cdot}0150$mm., a wave-length more than twenty times as great as that which Newton found for the lower limit of the spectrum, viz. $\lambda = 0{\cdot}0007$mm.

FABRY'S COMET.—Dr. H. Oppenheim has computed the following fresh elements and ephemeris for this comet:—

T = 1886 April 5·5398 Berlin Mean Time

$$\left.\begin{aligned} \omega &= 126^\circ\ 50'\ 27''{\cdot}6 \\ \Omega &= 36\ 19\ 54{\cdot}0 \\ i &= 82\ 11\ 15{\cdot}0 \end{aligned}\right\} 1886{\cdot}0.$$

$$\log q = 9{\cdot}804021$$

Ephemeris for Berlin Midnight

1886	R.A.	Decl.	Log. r	Log. Δ	Brightness
	h. m. s.	° ′			
March 7	23 19 34	31 19·6 N.	9·9441	0·1621	8
11	23 18 54	32 29·8	9·9171	0·1424	10
15	23 18 11	33 42·0	9·8904	0·1191	12
19	23 17 29	34 54·6 N.	9·8650	0·0916	16

The brightness on December 2 is taken as unity.

BARNARD'S COMET.—The following ephemeris by Dr. A. Krueger is in continuation of that given in NATURE for February 18, p. 376:—

For Berlin Midnight

1886	R.A.	Decl.	Log. r	Log. Δ	Brightness
	h. m. s.	° ′			
March 6	1 54 54	22 35·8 N.	0·1229	0·2415	4·10
10	1 53 55	23 45·9	0·1001	0·2390	4·61
14	1 53 6	24 58·9	0·0757	0·2352	5·25
18	1 52 26	26 14·9 N.	0·0497	0·2299	6·07

ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 *MARCH* 7-13

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on March 7

Sun rises, 6h. 34m.; souths, 12h. 11m. 10·0s.; sets, 17h. 48m.; decl. on meridian, 5° 11′ S.: Sidereal Time at Sunset, 4h. 49m.

Moon (two days after New) rises, 7h. 16m.; souths, 13h. 21m.; sets, 19h. 36m.; decl. on meridian, 0° 28′ N.

Planet	Rises	Souths	Sets	Decl. on meridian
	h. m.	h. m.	h. m.	° ′
Mercury	6 54	12 49	18 44	1 47 S.
Venus	5 1	10 30	15 59	6 48 S.
Mars	17 23*	0 15	7 7	9 24 N.
Jupiter	19 10*	1 15	7 20	0 16 N.
Saturn	10 54	19 5	3 16*	22 46 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

March	Star	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image
			h. m.	h. m.	° °
8	B.A.C. 408	6½	18 11	near approach	54 —
9	64 Ceti	6	17 31	18 38	118 342
9	ξ′ Ceti	4½	18 35	19 39	156 310
13	130 Tauri	6	16 49	18 1	91 253

Saturn, March 7.—Outer major axis of outer ring 43″·0; outer minor axis of outer ring 19″·3; southern surface visible.

March h.
10 ... 2 ... Venus stationary.

Variable-Stars

Star	R.A.	Decl.		h. m.	
	h. m.	° ′			
T Cassiopeiæ	0 17·1	55 10 N.	Mar.	10, 0 0	*m*
U Cephei	0 52·2	81 16 N.	,,	8, 20 36	*m*
			,,	20 16	*m*
V Tauri	4 45·4	9 42 N.	,,	12,	*M*
ζ Geminorum	6 57·4	20 44 N.	,,	10, 0 0	*m*
δ Libræ	14 54·9	8 4 S.	,,	11, 22 10	*m*
R Coronæ	15 43·9	28 30 N.	,,	12,	*M*
U Ophiuchi	17 10·8	1 20 N.	,,	9, 2 22	*m*
			,,	9, 22 30	*m*
X Sagittarii	17 40·4	27 47 S.	,,	10, 0 0	*m*
			,,	12, 21 30	*M*
U Sagittarii	18 25·2	19 12 S.	,,	9, 22 30	*m*
			,,	12, 22 30	*M*
S Vulpeculæ	19 43·7	27 0 N.	,,	11,	*m*
η Aquilæ	19 46·7	0 7 N.	,,	8, 4 50	*m*
S Aquilæ	20 6·4	15 17 N.	,,	13,	*m*
δ Cephei	22 24·9	57 50 N.	,,	12, 2 30	*m*

M signifies maximum; *m* minimum.

Meteor Showers

Two showers may be looked for on March 7, viz near γ Libræ, R.A. 233°, Decl. 18° S.; and near γ Herculis, R.A. 244°, Decl. 15° N. Other showers of the week:—Near ε Cassiopeiæ, R.A. 36°, Decl. 67° N.; from Virgo, R.A. 190°, Decl. 1° N.; from Cepheus, R.A. 300°, Decl. 80° N.

Stars with Remarkable Spectra

Name of Star	R.A. 1886·0	Decl. 1886·0	Type of spectrum
	h. m. s.	° ′	
124 Schjellerup	9 45 48	22 29·0 S.	IV.
132 Schjellerup	10 31 54	12 47·6 S.	IV.
D.M. +68°·617	10 37 9	68 0·6 N.	IV.
136 Schjellerup	10 46 5	20 38·8 S.	IV.
56 Leonis	10 50 5	6 47·7 N.	III.
R Crateris	10 54 58	17 42·8 S.	III.
ω Virginis	11 32 35	8 45·9 N.	III.
145 Schjellerup	12 19 24	1 24·1 N.	IV.
152 Schjellerup	12 39 46	46 3·8 N.	IV.
155*b* Schjellerup	12 51 57	66 36·6 N.	IV.
40 Comæ Ber.	13 0 49	23 13·8 N.	III.

THE SUN AND STARS[1]

II.

First Conclusions

THE view of the solar constitution, which was based upon the early work to which I have referred—work which dates from about the year 1860, and is therefore about a quarter of a century old—the view which grouped together, and endeavoured to make a complete story of all the facts which were known then, was this: the chemical substances which had been found to exist in the sun's atmosphere existed quite close—relatively quite close at all events—to the photosphere. When subsequent work demonstrated the existence of hydrogen to a con iderable height above this photospheric envelope, as I shall show presently, the idea was suggested that these chemical substances existed in the atmosphere, not pell-mell, not without order, because Nature is always full of the most exquisite order, but in the sequence of their vapour-densities, so that a very heavy vapour would be found low down in the atmosphere, and a very light one like hydrogen would be high up.

It was at first suggested that gaseous diffusion would prevent such a sorting out, until it was pointed out by an American mathematician, Prof. Pierce, that it was a good deal to ask that diffusion should act along a radius something like a million of miles long, and indeed he showed that it would not.

Before we go farther, I give tables of the different substances which so far have been traced in the sun's atmosphere by means of their spectral lines. The first gives the substances according to the results obtained by Kirchhoff,

[1] A Course of Lectures to Working Men delivered by J. Norman Lockyer, F.R.S., at the Museum of Practical Geology. Revised from shorthand notes. Continued from p. 403.